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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/645,890

08/20/2003

Hee-Choul Lee

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EXAMINER

RUTKOWSKI, JEFFREY M

ART UNIT

PAPER NUMBER

2619

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/645,890	Applicant(s) LEE, HEE-CHOUL	
	Examiner JEFFREY M. RUTKOWSKI	Art Unit 2619	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 May 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 August 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. **Figures 1-4** should be designated by a legend such as --Prior Art-- because only that which is old is illustrated [0022-0025 of the Pg Pub for the instant application]. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled “Replacement Sheet” in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

2. **Claim 6** is objected to because of the following informalities: the preamble of **claim 6** is objected to because there appears to be a typographical error, namely it appears the phrase “any one of claims 1” should be changed to “claim 1”. Also, **claims 9 and 10** are redundant because they both recite the same features and depend from **claim 7**. Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first and second paragraphs of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. **Claims 1-27** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant

Art Unit: 2619

art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The original specification does not describe converting input/output link protocols to an internal link protocol and vice versa.

5. **Claims 1-27** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is not clear what is meant by the terms "input/output link protocol" and "internal link protocol".

6. **Claims 1-24** are also indefinite because it is not clear what is meant by a "broken mesh network" because breaking the links of a mesh network changes the topology of the network, which results in a totally different network. It is also not clear what is meant by the phrase "monotone increasing way increment by 1".

7. **Claims 9-12 and 23-24** are indefinite because it is not clear what is meant by the term "broken" since the two elements are still interconnected.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

Art Unit: 2619

2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. **Claims 1-21 and 23-26** are rejected under 35 U.S.C. 103(a) as being unpatentable over Thorson (US Pat 5,533,198) in view of Passint et al. (US Pat 6,230,252), hereinafter referred to as Passint in view of Admitted Prior Art, hereinafter referred to as APA.

11. For **claim 1**, Thorson discloses a multi-dimensional broken mesh network, where each node is one or more processors (input/output protocol processing links connected to the broken links) [**col. 4 line 59, figure 1**]. Coordinates are used to define how information moves from a start node (starting switching element) to a destination node (ending switching element) [**col. 6 lines 16-20**]. If any of the links are broken between nodes, communication is restored by changing the direction of the information flow in a plus or minus direction [**col. 5 lines 55-58**].

12. Thorson discloses the use of processors (input/output protocol processors) in a mesh network. It is not clear from the teachings of Thorson if there are external links connected to the processors. Passint discloses a mesh network where router chips **0-7** (input/output protocol processors) all reside on the boundary of the mesh network and have external links [**figure 5**]. It would have been obvious to a person of ordinary skill in the art at the time of the invention to use Passint's topology in Thorson's invention to provide a scalable system [**Passint, abstract**].

13. Thorson discloses the use of a multi-dimensional mesh network where each processing node has a set of coordinates [**figure 1**]. Thorson's disclosure is not clear how many tuples are used to identify a coordinate. The APA discloses that conventional mesh networks have n tuple coordinates. Additionally, each element has n-1 same coordinates and a different coordinate of plus minus 1 [**0053**]. It would have been obvious to a person of ordinary skill in the art at the

time of the invention to use n-tuple coordinates in Thorson's invention to provide a way to find a processing unit from any location in the mesh.

14. Thorson does not disclose a processing element that performs protocol conversion. The APA discloses a switching network that makes use of protocol conversion to transport information [0014]. It would have been obvious to a person of ordinary skill in the art to perform protocol conversion in Thorson's invention to provide self-routing functionality.

15. The combination of Thorson and the APA disclose the use of n-tuple coordinates. It is not clear from the teachings of the combination if the coordinates are numbered in a monotone increasing way. Passint discloses a network that transmits packets of information between the processor nodes in the + and - directions of three dimensions and routes packets toward two nodes, which both include four processors. In other words, one router chip 50 communicates directly with eight processors (130, 131, 132, 133, 130', 131', 132', and 133') [col. 6, lines: 65-68, figures 3 and 19A]. It would have been obvious to a person of ordinary skill in the art at the time of the invention to use monotone increasing coordinates in Thorson's network to increase fault tolerance.

16. For **claim 2**, Thorson discloses a processing element that is made up of one or more processors [col. 8 lines 34-37 and figure 5].

17. For **claims 3, 5-6**, Thorson discloses a multi-dimensional broken mesh network, where each node can be one or more processors (input/output protocol processors) [col. 4 line 59, figure 1]. Thorson does not disclose the use of jumping routes. Passint discloses a network where diagonal routes (jumping routes) are used to interconnect elements [figure 5]. It would

have been obvious to a person of ordinary skill in the art at the time of the invention to use jumping routes in Thorson's network to increase fault tolerance.

18. For **claim 4**, Thorson does not disclose the use of a control system bus. Passint discloses a system control bus that interconnects two processors **30, 32 [figure 1]**. It would have been obvious to a person of ordinary skill in the art at the time of the invention to use a system control bus in Thorson's network to increase fault tolerance.

19. For **claim 7**, Thorson discloses coordinates are used to define how information moves from a start node (starting switching element) to a destination node (ending switching element) **[col. 6 lines 16-20]**. If any of the links are broken between nodes, communication is restored by changing the direction of the information flow in a plus or minus direction **[col. 5 lines 55-58]**.

20. For **claim 8**, Thorson does not disclose elements having n-1 same coordinates and the different coordinate different by 1. The APA discloses that conventional mesh networks are have n tuple coordinates. Additionally, each element has n-1 same coordinates and a different coordinate of plus minus 1 **[0053]**. It would have been obvious to a person of ordinary skill in the art at the time of the invention to use n-tuple coordinates in Thorson's invention to provide a way to find a processing unit from any location in the mesh.

21. For **claims 9-12**, Thorson does not disclose the use of jumping routes. Passint discloses a network where diagonal routes (jumping routes) are used to interconnect elements **[figure 5]**. It would have been obvious to a person of ordinary skill in the art at the time of the invention to use jumping routes in Thorson's network to increase fault tolerance.

22. For **claim 13**, Thorson discloses the use of an input buffer with an input buffer monitor and an output buffer **[col. 4 lines 62-63, col. 8 lines 55-57 and figure 5]**.

23. Thorson does not disclose the use of a switching controller. Passint discloses a router chip **50** (switching controller) examines a sideband to determine which virtual channel buffer the message belongs in [**col. 16 lines 41-43**]. It would have been obvious to a person of ordinary skill in the art at the time of the invention to use a switching controller in Thorson's network to control congestion [**Passint, col. 16 lines 43-44**].

24. For **claim 14**, Thorson discloses the use of an input buffer with an input buffer monitor and an output buffer [**col. 4 lines 62-63, col. 8 lines 55-57 and figure 5**]. Thorson does not disclose the use of an output buffer monitor. Passint discloses a router chip **50** (output buffer monitor) examines a sideband to determine which virtual channel buffer the message belongs in [**col. 16 lines 41-43**]. It would have been obvious to a person of ordinary skill in the art at the time of the invention to use a switching controller in Thorson's network to control congestion [**Passint, col. 16 lines 43-44**].

25. For **claim 15**, Thorson discloses if a node **42.18** wants to send a message to node **42.17**, it would access the look-up table for the stored (buffered) entry stored for corresponding to node **42.17** [**col. 9, lines 22-25 and col. 10 lines 44-46**].

26. For **claim 16**, Thorson does not disclose the use of dynamic self-routing. Passint discloses a routing scheme where global routing and local routing are used to provide routing information dynamically as they pass through network [**col. 11 lines 15-18**]. It would have been obvious to a person of ordinary skill in the art at the time of the invention to use dynamic routing in Thorson's network to increase fault tolerance.

27. For **claim 17**, Thorson does not disclose packet discard techniques. Passint discloses a router receives block **102**, accepts data includes virtual channel management for keeping or

discarding data [**col. 11 lines 10-13**]. It would have been obvious to a person of ordinary skill in the art at the time of the invention to use discard techniques in Thorson's network to increase fault tolerance.

28. For **claim 18**, Thorson does not disclose the use of FIFO discard. Passint discloses a router receives block 102, accepts data includes virtual channel management, dynamically allocating memory queues similar to First-In First-Out (FIFO) for keeping or discarding data [**col. 11 lines 10-13**]. It would have been obvious to a person of ordinary skill in the art at the time of the invention to use FIFO discard techniques in Thorson's network to increase fault tolerance.

29. For **claims 19 and 20**, Thorson discloses the use of n-tuple delta values by disclosing a situation where the link between nodes 12.14 and 12.11 is rendered inoperable, communication is still possible simply by changing the direction ordering so as to change the occurrence of the -y move. In that case, the direction order routing method could be chosen as (+x, -y, z, -x, +y, -z) and the packet to be transferred between node 12.7 and node 12.11 will be transferred from node 12.7 to node 12.8 and then through nodes 12.5 and 12.2 to node 12.11 [**col. 5 lines 63-67**].

30. Specifically for **claim 20**, Thorson discloses the use of processors connected to memory [**col. 8 lines 36-38, figure 5**].

31. For **claims 21 and 23-24**, Thorson does not disclose the use of switching elements mounted on a switching board. Passint discloses routers that are mounted on circuit boards [**col. 9 lines 17-18**]. Figure 10 if Passint suggests using wiring to interconnect the routers. It would have been obvious to a person of ordinary skill in the art at the time of the invention to use Passint's arrangement in Thorson's network to increase fault tolerance.

32. For **claim 25**, Thorson discloses a switching system that has n- dimensionally arranged frames; n-dimensional unit cells defined by n-tuple frames of each dimension [**Figure 1**].

33. Thorson discloses the use of processors [**col. 4 line 59, figure 1**]. Thorson does not disclose a processing element that performs protocol conversion. The APA discloses a switching network that makes use of protocol conversion to transport information [**0014**]. It would have been obvious to a person of ordinary skill in the art to perform protocol conversion in Thorson's invention to provide self-routing functionality.

34. Thorson does not disclose the use of switching boards mounted in an unit cell. Passint discloses a router board that includes four routers (switching boards mounted in unit cell) [**figure 5**]. It would have been obvious to a person of ordinary skill in the art at the time of the invention to incorporate and establishing a method for routing a packet between a source and a destination node in a network system with n-dimensional topology in Thorson's invention to increase fault tolerance.

35. For **claim 26**, Thorson does not disclose unit cells that do not have the switching board. Passint discloses routers **1 and 3** do not have switching boards [**figure 10**]. It would have been obvious to a person of ordinary skill in the art at the time of the invention to uses routers that do not have switching boards in Thorson's invention to increase fault tolerance.

36. **Claims 22 and 27** are rejected under 35 U.S.C. 103(a) as being unpatentable over Thorson in view of Passint and the APA as applied to **claims 21 and 25 respectively** above, and further in view of Brock et al. (US Pat 6,836,849), hereinafter referred to as Brock.

37. For **claim 22**, the combination of Thorson, Passint and the APA do not disclose the use of a cooling flow. Brock discloses the use of a cooling fan **322** and a solid state cooling device **323**

[**figure 3**]. It would have been obvious to a person of ordinary skill in the art at the time of the invention to use cooling fans in Thorson's invention to keep elements from overheating.

38. For **claim 27**, the combination of Thorson, Passint and the APA do not disclose the use of a guide means. Brock discloses a guide means by showing a multiprocessor system **304** that is inserted into the slot of rack **301** [**figure 1**]. It would have been obvious to a person of ordinary skill in the art at the time of the invention to use a guide means in Thorson's invention to interconnect different elements.

Response to Arguments

39. Applicant's arguments with respect to **claims 1-27** have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JEFFREY M. RUTKOWSKI whose telephone number is (571)270-1215. The examiner can normally be reached on Monday - Friday 7:30-5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hassan Kizou can be reached on (571) 272-3088. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2619

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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08/11/2008

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